IN THE SPECIFICATION:

Please replace the Title as follows:

"Biochip For Detecting Biochemical Reactions Having Independently Temperature-Controlled Probe Cells"

IN THE CLAIMS:

Claims 1-4 are pending in the application. Please amend claims 1 and 4 as follows:

1. (Currently Amended) A biochemical reaction detection apparatus, comprising;

a first membrane;

a plurality of islands provided on one [said] side of said first membrane[,]; and[']

probe cells for immobilizing probes for detecting [the] biochemical reactions, said probe cells being provided on [the other] a side opposite to said one side of said first membrane though [the] a cross section of the first membrane,[;]

wherein said islands are spaced from each other with intervals filled with a heat insulating material, and each of the islands [is provided with] includes a temperature controller for heating and temperature-controlling said probe cells independently.

2. (Original) The biochemical reaction detection apparatus according to claim 1, wherein the interval between each of said islands is 50 μm or longer.

3. (Original) The biochemical reaction detection apparatus according to claim 1, wherein the interval between each of said islands is 100 μm or longer.

4. (Currently Amended) The biochemical reaction detection apparatus according to claim 1, wherein [[the heat conductivity of]] said first membrane [[is]] has a heat conductivity of 10 [[μm]] w/mk (watt/(meter [[*]]• kelvin)) or less.

REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Official Action dated April 25, 2003. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 1-4 are under consideration in this application. Claims 1 and 4 are being amended, as set forth above and in the attached marked-up presentation of the claim amendments, in order to more particularly define and distinctly claim Applicants' invention.

Additional Amendments

The claims are being amended to correct formal errors and/or to better disclose or describe the features of the present invention as claimed. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Formality Rejections

The Title was objected to as being non-descriptive, and claims 1 and 4 for various informalities, and claims 1-4 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite. As indicated, the Title and the claims have been cancelled or amended as required by the Examiner. Accordingly, the withdrawal of the outstanding informality rejection is in order, and is therefore respectfully solicited.

Double Patenting Rejection

A nonstatutary double patenting rejection based upon a judicially created doctrine was raised against claims 1-4 as being unpatentable over claim 1 of the patent issued into U.S Pat. 6,428,749.

Applicants contend that claim 1 of the application now recites a distinctive limitation of "said islands are spaced from each other with intervals filled with a heat insulating material" that is different from the limitation "a membranous substrate whose heat conductivity is 10 w/mk (watt/(meter • kelvin)) or less" of claim 1 of the '749 patent. Accordingly, the withdrawal of the outstanding double patenting rejection is in order, and is therefore respectfully solicited.

Prior Art Rejections

Claim 1 was rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Pat. No. 6,093,370 to Yasuda et al (hereinafter "Yasuda"), and claim 4 was rejected by Yasuda as defined by Handbook of Chemistry & Physics, and claims 2-3 were rejected under 35 U.S.C. § 103(a) as being unpatenable over Yasuda in view of U.S. Pat. No. 6,051,380 Sosnowski et al. (hereinafter "Sosnowski"). These rejections have been carefully considered, but are most respectfully traversed.

The biochemical reaction detection apparatus (e.g. Fig. 2B; page 26, 2nd-3rd paragraphs) of the invention, as now recited in claim 1, comprises: a first membrane 22; a plurality of islands 21 provided on one side of said first membrane; and probe cells for immobilizing probes 25 for detecting biochemical reactions, said probe cells being provided on a side opposite to said one side of said first membrane though a cross section of the first membrane. The islands 21 are spaced from each other with intervals D filled with a heat insulating material (page 6, line 15), and each of the islands 21 includes a temperature controller 23 for heating and temperature-controlling said probe cells independently (page 6, line 17).

None of the cited prior art references teaches or suggests such "islands (1) being provided across a membrane from probe cells, (2) including a temperature controller for heating and temperature-controlling said probe cells independently, and (3) being spaced from each other with intervals D filled with a heat **insulating** material. Since there is no substantial heat transmission from one island to the other, the temperature of each island can be accurately and separately controlled.

In contrast, each of the alleged islands in Yasuda (Fig. 11) includes a heating element 225 sandwiched between a planar electrode 226 and one common planer electrode 224 (Fig. 12C) is spaced from each other with intervals filled with a heat **conductive** (rather than "**insulating**") material. Since the temperature of a specific target polynucleotide hybridization area 221 is controlled by a potential applied to a pair corresponding electrodes 226, 224 (col. 12, lines 2-11), the material

filled between the sandwich structure of 224, 225, 226 must be heat conductive such that the heat evolved by the heating element 225 can be transmitted upward towards a corresponding polynucleotide hybridization area 221, and downwards towards a corresponding thermistor 231 for detecting the temperature of corresponding polynucleotide hybridization area 221 (col. 11, lines 58-62). Inevitably, the sandwich filling material among islands also transmits heat horizontally among different islands. There is simply no mechanism for blocking the heat transmission between adjacent islands in Yasuda.

In addition, several heating element layers 225 are located within one temperature control unit 133, and several thermistors 231 are located within one thermally conductive insulating substrate 132. Specifically, a heating element layer 225 heats the probe hybridization layer 221 through the temperature control unit 133, and this temperature control unit 133 is also in contact with the other heating element layer 225. When the heating element layer 225 evolves heat, the heat is transmitted to the other heating element layer 225 through the temperature control unit 133. Accordingly, temperature of a probe hybridization layer 221 is interfered by that of the adjacent probe hybridization layer 221. Further, the thermistor 231 detects temperature of the probe hybridization layer 221 of interest through the thermally conductive insulating substrate 132. At the same time, it detects temperature of the probe hybridization layer 221 existing in the vicinity. Thus, temperature of each probe hybridization layer 221 cannot be accurately controlled according to the technique of Yasuda.

Sosnowski fails to compensate for Yasuda's deficiencies since it merely concerns a method that does not individually control temperature of each island. Thus, the premise thereof is different from that of the present invention. There is no disclosure of a technical idea for adjusting the interval between islands heated by a temperature controller, etc. or for avoiding the heat transmission between islands.

Regarding the rejection against claim 4, Applicants respectfully contend that the Examiner improperly combined the Embodiment II (col. 11, lines 43-62) and the Embodiment III (col. 13, lines 35-57) of Yasuda (page 5, last paragraph of the outstanding office action), since there is no teaching of combining the two heating methods or combining a temperature controller and a glass substrate in Yasuda. Embodiment II concerns a heating method using the heating element layer 225. On the

other hand, the Embodiment III concerns a heating method through YAG laser irradiation instead of the heating element layer 225 (lines 49-64, Column 15).

Accordingly, Applicants contend that the cited conflicting teachings of the prior art references would not motivate their combination such that their combination would embody each and every feature of the present invention as now claimed in claim 1 from which claims 2-4 depend. The difference is more than sufficient that the present invention as now claimed would not have been rendered obvious given the prior art. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

In view of all the above, clear and distinct differences as discussed exist between the present invention as now claimed and the prior art reference upon which the rejections in the Office Action rely, Applicants respectfully contend that the prior art references cannot anticipate the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and phone number indicated below.

Respectfully submitted,

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